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APPLICATION OF A COMPUTERIZED GENERAL PURPOSE  
INFORMATION MANAGEMENT SYSTEM (SELGEM) TO MEDICALLY  
IMPORTANT ARTHROPODS (DIPTERA: CULICIDAE)

Annual Report

Terry L. Erwin

July 1982

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Smithsonian Institution

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complete mosquito collection in the world and represents a national treasure. The data management system, SELGEM (SELf-GEnerating MAster), was selected as the primary data storage/management system. Data recorded on collection forms are submitted to a Honeywell • Series 60 Level 66/80 computer system via a Nixdorf • 600/55 minicomputer data entry sytem.

During this report period an additional 3,173 collection records, representing roughly 126,000 specimens, were entered into the computer. Of this total, 1,860 collections and 74,000 specimens were processed during the last four month period after the addition of a second staff member.

The development of separate geographic files continued with the addition of Eastern Africa file and the near completion of data entry for the Central America file. A total of 7 files have now been initiated, incorporating data for Central America, South America, the Caribbean Region and Eastern Africa. These files allow for a rapid and inexpensive search capability that will be a major advantage as the data base expands.

Project capabilities were greatly enhanced by the purchase of a computer program that allows the production of computer-digitized maps. In addition, the WRBU NBI® Word Processor was tailored for communications with the Smithsonian's Honeywell® Computer. This provides a storage capability for answers to MIMP queries. Further, the project received a complete set of country gazetteers from the Defense Mapping Agency, and increased the map collection to over 10,200 maps.

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ANNUAL REPORT  
MOSQUITO INFORMATION MANAGEMENT PROJECT

SUMMARY

The Mosquito Information Management Project (MIMP) is a collaborative venture between the Walter Reed Biosystematic Unit (WRBU), Walter Reed Army Institute of Research (WRAIR), and the Department of Entomology, Museum of Natural History, Smithsonian Institution. The project was established in September 1979, to develop a computer-based systematic and ecological master file (data bank) for the approximately one million mosquito specimens in the Museum of Natural History collection. This collection is the largest and most complete mosquito collection in the world and represents a national treasure. The data management system, SELGEM (SELf-GEnerating Master), was selected as the primary data storage/management system. Data recorded on collection forms are submitted to a Honeywell® Series 60 Level 66/80 computer system via a Nixdorf® 600/55 minicomputer data entry system.

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**FOREWORD**

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## INTRODUCTION

The National Museum of Natural History, Smithsonian Institution, houses a mosquito collection of over one million specimens from all over the world. This collection is the largest of its kind and is well curated. During the last 18 years the collection has grown 5-fold, primarily due to several U. S. Army Medical Research and Development Command contracts, i.e., the Southeast Asia Mosquito Project (SEAMP), the Mosquitoes of Middle America Project (MMA) and the Medical Entomology Project (MEP). World areas that are particularly well represented in the collection are the Nearctic, Neotropical, Oriental and South Pacific faunal regions. These specimens, combined with their associated collection data/records, represent a major scientific resource for Medical Entomologists, Epidemiologists and Public Health Workers. Unfortunately, the collection has received very little attention to date (except by taxonomists).

The Mosquito Information Management Project (MIMP) was established in 1979 to develop this outstanding source of data on known and potential vectors of human pathogens into a computer-based systematic and ecological master file (data bank). The master file will be based on data from specimens identified by taxonomic authorities and will: (1) provide important, easily accessible, systematic and ecological data for species of known or potential importance to the military, public health organizations and other scientific and environmental agencies; (2) enhance current and future laboratory and field mosquito research efforts; (3) provide knowledge of deficiencies in the collection and allow new collection strategies; (4) alleviate managerial problems by providing a timely and cost-efficient collection inventory; and (5) serve as a model for the storage/analysis of mosquito biological data on a world-wide level.

The project works in close association at the Smithsonian Institution with: (1) Walter Reed Biosystematics Unit, Department of Entomology, Walter Reed Army Institute of Research; (2) Medical Entomology Project; (3) Department of Entomology, Smithsonian Institution; and (4) Systematic Entomology Laboratory, U. S. Department of Agriculture. It was designed to be responsive to the needs of these organizations, as well as other governmental or institutional scientific organizations.

REVIEW OF PROGRESS FOR THE PERIOD  
1 JULY 1981 TO 30 JUNE 1982

I. Personnel and Equipment

- A. A second museum technician (GS-5), Ms. Elaine Peret, was hired in early March 1982. Unfortunately, she resigned her position as of 23 June 1982. However, the brief stay of Ms. Peret was most beneficial to the project and significantly increased data input into the master file. Based on the productiveness of the 2 technicians over a 4 month period it was decided a new technician should be hired. This was accomplished by 30 June and a new technician will begin working with the project in mid-July 1982.
- B. During this period the computer program, World Data Bank II was obtained from the National Technical Information Service. This program will allow the production of computer-digitized maps for plotting species collection sites and distribution maps based on the specimens in the collection. The program was given to the Office of Computer Services, Smithsonian Institution, for incorporation into the Honeywell® Computer.
- C. The NBI® Word Processor in the Walter Reed Biosystematics Unit was tailored to the Smithsonian's Honeywell® Computer for communications via time-sharing. This enables MIMP to copy query replies on a floppy disk for storage and later use.
- D. An additional 10 diskettes were purchased for the word processor, and 7 file cabinets were obtained for map storage. Also, 300 maps were received, expanding the map collection to 10,200 maps. In addition, a complete set of country gazetteers was received from the Defense Mapping Agency.

II. Data Input

- A. An additional 3,173 collection forms were entered into the SELGEM master file during this period, representing approximately 126,000 specimens. The majority of forms originated from Central American collections present in the John N. Belkin Collection, which was purchased by the Smithsonian Institution. The purchase of the Belkin Collection provided an extremely important data source for the project. The extensive collection records and specimens in the Belkin Collection filled numerous gaps that were present in the National Museum collection. Currently, all of the Central American collections have been entered into the computer, except for those from Mexico,

Costa Rica and Panama. Once this region has been completed, major emphasis will shift to the extensive Belkin collections from South America and the Caribbean Regions.

In addition to the Belkin collections, records were also entered during this period from small personal collections from Mexico, Bolivia and Colombia. Also, 136 collection forms from Kenya were entered into the computer. These represent the first entries for the Eastern Africa Region.

With the above entries, a total of 6,813 collection forms and 196,000 individual specimens have been entered into the master file. With the addition of a second technician, it is anticipated these figures will increase significantly during the next year.

- B. Currently, 7 separate geographic files have been established to simplify and speed up the efficiency of queries to the master file. The use of such files quickly reduces the search effort for specific queries, and will greatly reduce computer charges as the data base expands. The 7 geographic files established to date are:

1. Mexico and Central America-includes Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama.
2. Western South America-includes Chile, Colombia, Ecuador, Peru, and Venezuela.
3. Northeastern South America-includes Brazil, French Guiana, Guyana, and Suriname.
4. Southeastern South America-includes Argentina, Bolivia, Paraguay, and Uruguay.
5. Greater Antilles-includes Bahama Islands, Cayman Islands, Cuba, Dominican Republic, Haiti, Jamaica, Puerto Rico, and Virgin Islands.
6. Lesser Antilles-includes Anguilla, Antigua, Barbados, Barbuda, Dominica, Grenada, Guadeloupe, Martinique, Montserrat, Nevis, St. Kitts, St. Lucia, St. Martin, St. Vincent, and Trinidad and Tobago.
7. Eastern Africa-includes Burundi, Kenya, Madagascar, Malawi, Mozambique, Rwanda, Southern Rhodesia, Uganda, United Republic of Tanzania and Zambia.

### III. Queries and/or Requests

A standard information form (see Appendix) which will summarize data from the master file for 9 specific questions for any species in any country, was developed with the assistance of personnel from the Office of Computer Services, Smithsonian Institution. The form was developed in anticipation of

queries regarding the distribution of known or potential vectors of human pathogens. Once the data base in the master file is of sufficient size to handle queries, this data sheet, in conjunction with a digitized distribution map, could be of considerable assistance in epidemiological and vector control studies.

A test was performed during this period to determine the exact procedures, turn-around times, and backup systems for obtaining information and digitized maps from the Smithsonian's Honeywell® Computer. The test was conducted with the assistance of personnel of the Office of Computer Services, Smithsonian, in the absence of an on-line query capability in MIMP and prior to the incorporation of the World Data Bank II program into the Honeywell® Computer. The test was most informative, revealing capabilities and limitations of responses to MIMP queries in the absence of an on-line query system. Now that the World Data Bank II program has been incorporated into the computer, the digitized map making capability is much more timely and superior.

During the year, the MIMP staff received and answered a number of requests, to include:

1. All mosquito collection records for Bolivia, Peru and Kenya.
2. Specific mosquito collection records from Guyana.
3. All collection records of *Anopheles (Nys.) darlingi* in Honduras.
4. A printout of all collections made by 5 particular collectors.
5. A digitized map of El Salvador showing collection sites of *Anopheles (Nys.) albimanus*.
6. Records of *Aedes aegypti* immatures in natural containers in the Lesser and Greater Antilles.
7. A list of the countries and country codes for incorporation into the data management system at the Smithsonian Institution.
8. Maps for Bolivia, Kenya, Peru, Suriname and Venezuela.
9. General information about the project and collection forms sent to 15 requestors.

#### IV. Other Activities

- A. Separate meetings were held with LTC Ralph R. Carestia, Chief, Defense Pest Management Information Analysis Center (DPMIAC), Armed Forces Pest Management Board and Dr. Lloyd V. Knutson, Chairman, Insect Identification and Beneficial Insect Introduction Institute (IIBIII). These meetings were intended to stimulate an exchange of information and provide a basis for possible future collaborative efforts. In conjunction with the meeting with Dr. Knutson, LTC Bruce A. Harrison, Chief, Walter Reed Biosystematics Unit (WRBU), and Ms. Charlotte Burnett, Project Manager, MIMP, visited the Beltsville Agricultural Research Center to learn about the Information Management Systems for the Insect Identification and Beneficial Insect Introduction Institute (IIBIII).

- B. Personnel in MIMP, or affiliated with the project, attended several scientific meetings during this period: (1) annual meeting of the Entomological Society of America (ESA); (2) annual meeting of the American Mosquito Control Association (AMCA); and (3) Computers in Research at the Smithsonian Symposium, Smithsonian Institution. CPT Michael E. Faran, presented papers describing MIMP during the first 2 meetings and Ms. Charlotte Burnett presented a paper describing MIMP at the last meeting. Considerable interest in MIMP was stimulated by these presentations, resulting in a number of requests (above) and visitors (below). In addition, information of value to the programming of MIMP was obtained by the participants.
- C. A paper entitled "Computerized Information and Collection Management System for Systematic Research and Medical Entomology (Diptera: Culicidae)" and authored by MIMP and Office of Computer Services personnel is currently in preparation for publication. This paper is being submitted to the Journal of Medical Entomology, and should bring the project to the attention of medical researchers who would benefit from this valuable data base.
- D. During the year MIMP received a large number of visitors from the following organizations: School of Public Health, UCLA, Los Angeles, California; Defense Pest Management Information Analysis Center (DPMIAC), Armed Forces Pest Management Board, Washington, DC; Division of Parasitic Diseases, Centers for Disease Control (CDC), Atlanta, GA; Insect Identification and Beneficial Insect Introduction Institute (IIBIII), USDA, Beltsville, MD; Soil Conservation Service, USDA, AZ; U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID), Ft. Detrick, MD; Texas Tech School of Medicine, Lubbock, TX; Topographic Sciences Corporation, Vienna VA; Office of the Surgeon General, Washington, DC; University of Notre Dame, Notre Dame, IN; University of Illinois, Urbana, IL; Department of Natural Resources, Milford, DE; Bernice P. Bishop Museum, Honolulu, HA; Universidade de Brasilia, Brasilia, Brazil; USAID, Mexico City, Mexico; and National Institute for Tropical Diseases, Tzaneen, South Africa.

## Appendix

(Mosquito Species) in (Country)  
MIMP Data Sheet

DATE:

PAGE NO.

## 1. TOTAL NUMBER OF COLLECTIONS-

## 2. COLLECTION NUMBERS AND GEOGRAPHIC COORDINATES-

Collection Numbers	Geographic Coordinates
-	
-	
-	
-	

## 3. TOTAL NUMBER OF STATE/PROVINCE/DEPTS-

## 4. STATE/PROVINCE/DEPT NAMES and FREQUENCY OF OCCURRENCE-

Names	Frequency
-	
-	
-	
-	

## 5. COLLECTION TYPES-

a. TOTAL NUMBER OF LARVAL HABITATS-

b. TOTAL NUMBER OF ADULT HABITATS-

c. HABITAT DESCRIPTIONS FOR LARVAL COLLECTIONS-

TOPOGRAPHY

HUMAN INFLUENCE

MODIFIERS

BREEDING SITE

COLLECTION NUMBERS

d. HABITAT DESCRIPTIONS FOR ADULT COLLECTIONS-

TOPOGRAPHY

HUMAN INFLUENCE

SPECIFIC SITE

COLLECTION METHOD

COLLECTION NUMBERS

6. ELEVATION RANGE-

LOW-

HIGH-

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